

# Sarcotherm

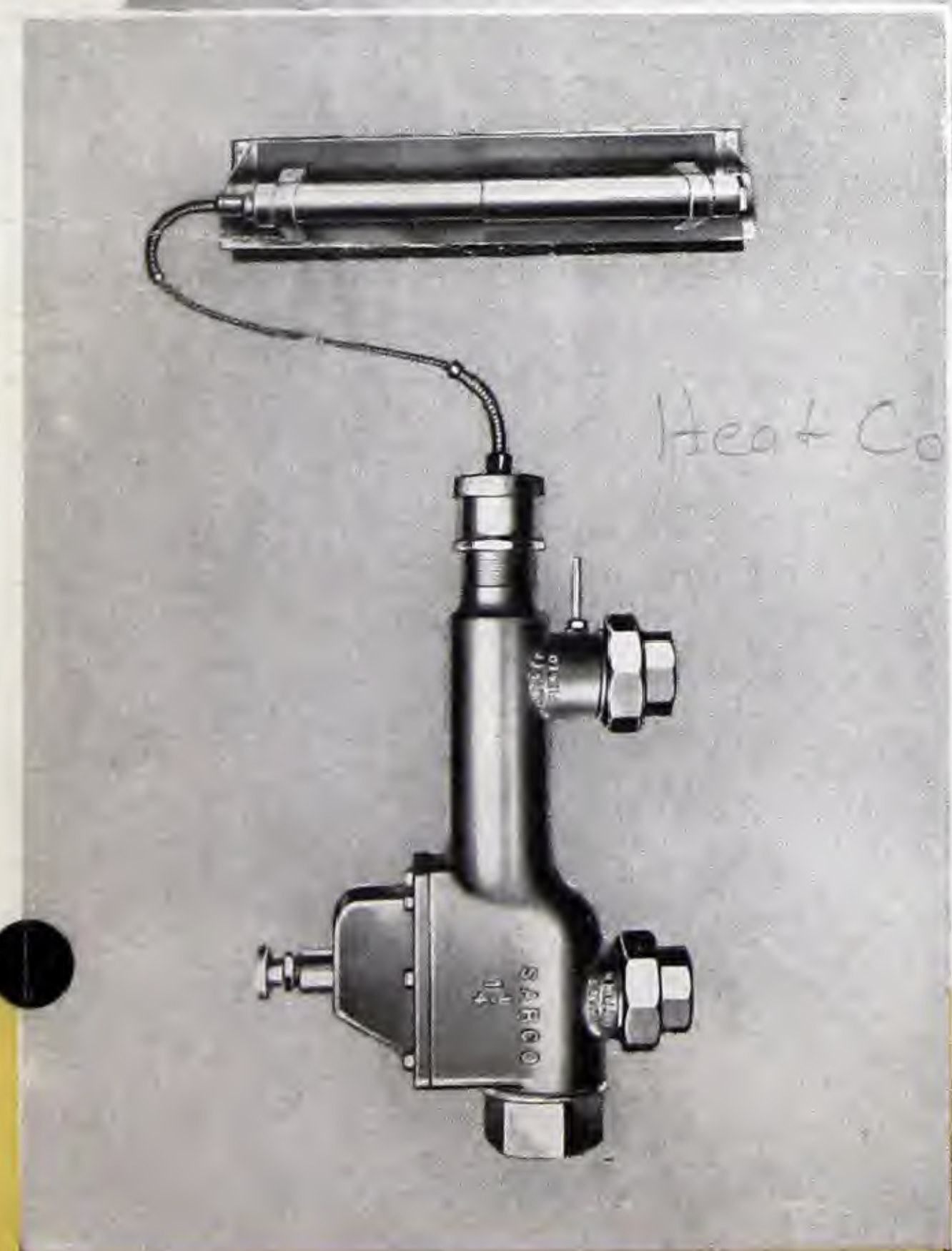
*Weather Control  
for  
Hot Water Heating*



Sarcotherm Equipped—Residence of Dr. & Mrs. S. G. McIntosh,  
Lake Forest, Ill., Anderson & Ticknor, Lake Forest, Architects.

This fully automatic system, by simple mechanical means, assures:

1. Uniform room temperatures under all weather conditions.
2. Smaller temperature differences ceiling to floor, resulting in less heat loss.
3. Less strain on boiler because boiler is operated at constant water temperature.
4. Substantial savings in first cost of installation, because high water temperature can be utilized during periods of extreme weather conditions, thus permitting of smaller pipe sizes.
5. Large fuel savings by preventing overheating in mild weather.



## SARCO COMPANY, Inc.

475 Fifth Avenue

Branches in Principal Cities

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Sarco Canada Limited, 85 Richmond Street, West, Toronto, Ont.



## The Comfort of Hot Water Heat

It has long been recognized that the lower radiator temperatures of hot water provide comfortable heat for the occupants of buildings, large or small.

Since radiator temperatures are lower, there is less tendency to overheat sections of the room, thus avoiding that parched feeling noticeable with high radiator temperatures.

Hot water heat can be maintained more uniformly, since it is not subject to rapid fluctuations of temperature.

### The Economies of Forced Circulation

The old systems relying on natural circulation required larger radiators and pipes, making for higher first cost. They were invariably sluggish and therefore difficult to control automatically. This became more serious with the advent of oil or gas burners and automatic stokers, which need something more responsive to automatic control. Forced or accelerated circulation of the water thru the system by means of a pump provided the answer by enabling the system to respond rapidly to the controls applied. Forced circulation further broadens the possibilities for hot water radiator heat, since it makes possible the use of modern concealed convectors, as used for steam, where these are desired.

### Problems of Control

Perfect comfort for the occupants, regardless of weather conditions, must always be the first consideration in the design of any heating system and of its controls.

To preserve the outstanding advantages of hot water heat, it is necessary to maintain a moderate radiator temperature, modulated gradually without violent fluctuations. To achieve this, it is obviously inconsistent to rely on intermittent operation. Any on-and-off control disturbs the even flow of water thru the system. Therefore, on forced hot water heating systems, room temperatures should be controlled independently of the boiler operation.

### Anticipating Room Temperature Fluctuations

The older method of controlling the heat by starting and stopping the circulator may be simple, but it has two serious disadvantages. In the first place, even the best room thermostats have a definite lag (much depends on their location), so that rooms often become quite uncomfortable before the recirculation of heat has time to restore the desired radiator temperature.

The second factor is of even greater importance. When circulation stops, radiators, and copper convectors in particular, cool off rapidly. This causes the circulation of air produced by the warm radiator to cease entirely. The air then stratifies and cold layers develop near the floor.

Ideal temperature control must anticipate temperature changes and do so without losing the advantages of continuous forced circulation. That is the Sarcotherm System.

### SARCOTHERM A Simple, Mechanical Control

Sarcotherm is simplicity itself. It consists of a sturdy thermostatic three-way valve, adapted to recirculate to the system a varying portion of the returned water, adding automatically the right proportion of hot water from the boiler to maintain the correct radiator temperatures.

A simple liquid expansion thermostat is mounted on an outside wall of the building, usually with a northwest exposure. Pressure built up within this thermostat, when it absorbs heat, is transmitted thru flexible connecting tubing to the valve operator A (Fig. 1), thus pushing piston B downward. Hot water enters the valve at 1, and return water from the system thru inlet 2 at the lower right. Hot and cold water pass thru the mixing valve S, then over

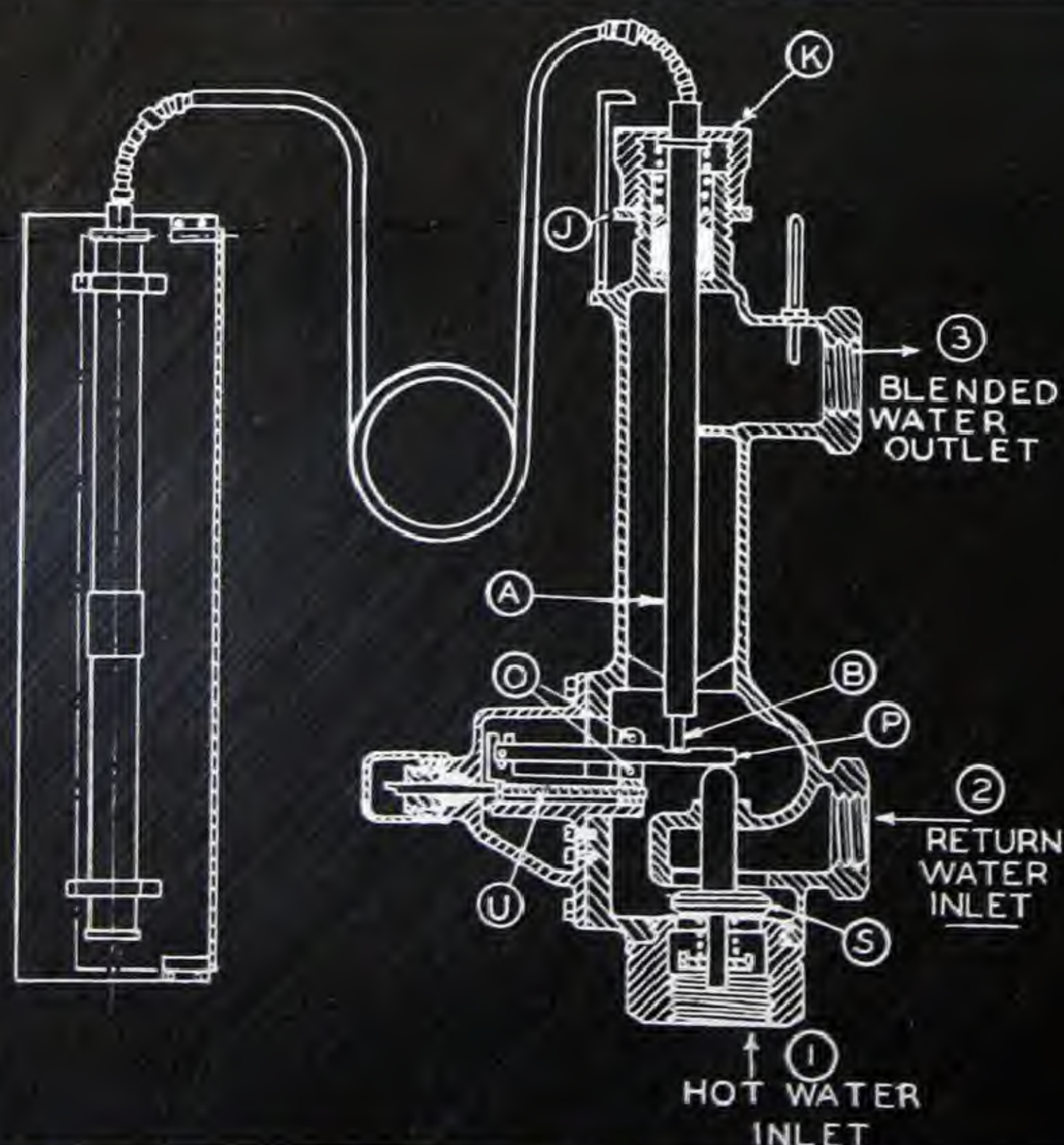


Fig. 1. The Sarcotherm Control Valve, Type ST



valve operator A and to the system thru outlet 3.

The operator A forms a part of the thermostatic system, so that the position of mixing valve S is determined by the combined influence of outside temperature at the bulb and that of the mixed water flowing over A. The two members of the thermostatic system are so proportioned as to supply to the radiators water of exactly the temperature needed for the weather conditions existing at any given time.

Curve S, Fig. 2, illustrates the result of this action. It is assumed on this chart that at 0° F. outside temperature, the water flowing to the radiators is to have a temperature of 180° F., and that at 70° F. outside, the water temperature is to be 90° F. At all intermediate points, the Sarcotherm automatically varies the temperature of the water flowing to the system in ac-

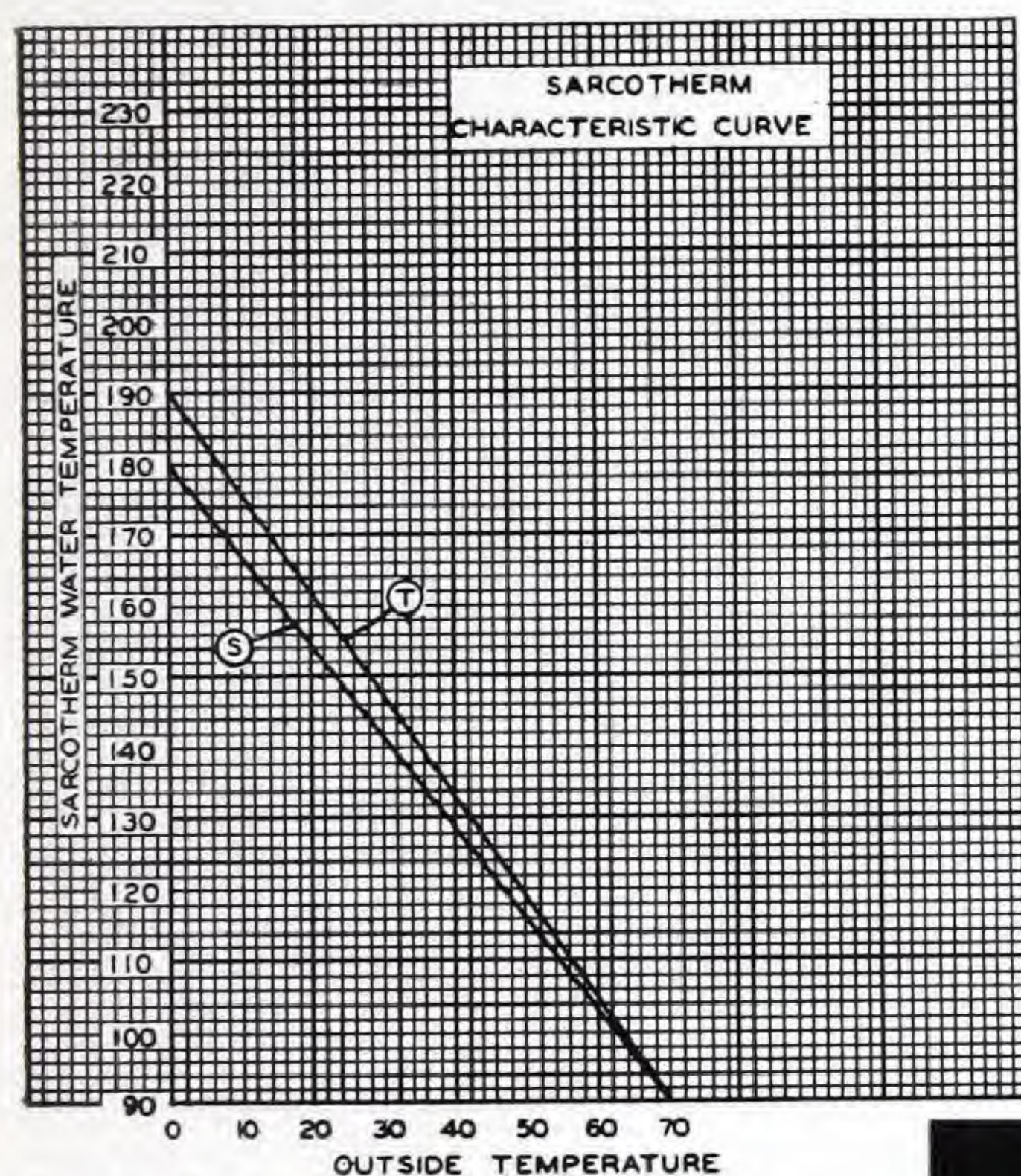


Fig. 2. Typical curves of system water temperatures for given outside temperatures.

cordance with this predetermined gradient. Any other set of base temperatures may be taken care of, depending on the geographical location of the building and the desires of the owners.

### Simple Adjustment

Should it be found in service that the calculated curve is unsuitable and that either a steeper or a flatter gradient is desirable, a simple correction can be made on the valve itself without interrupting the operation of the system.

The thermostat A actuates the valve S thru the lever P, which is pivoted at O. This fulcrum point can be moved in or out by turning the screw U with the key provided. In this way the amount of valve movement for a given temperature change can be modified. Curve S might be changed, for example, to that shown at T in Fig. 2.

Should it be found that either higher or lower water temperatures should be provided in the system thru the entire range of outside temperatures, then the desired adjustment can readily be made by loosening locknut J and turning knob K up or down as may be needed.

### List Prices and Shipping Weights, Sarcotherm, Type ST

Size	Construction	Connections	List Price	Shipping Wt. Lbs.
1 1/4"	Brass	Screwed	\$110.00	65
1 1/2"	Brass	Screwed	118.00	65
2"	Iron	Screwed	130.00	85
2 1/2"	Iron	Screwed	150.00	120
3"	Iron	Screwed	170.00	120
4"	Iron	Flanged	215.00	185

Above prices include 20 ft. of flexible connecting tubing between outside thermostat and valve. For longer connecting tubing up to a maximum of 100 ft., add 50c list per foot.

When ordering, specify: 1, Valve size; 2, Length of connecting tubing; 3, Temperatures of water leaving Sarcotherm valve, "a" for lowest winter outside temperature (usually 0° F. or minus 15° F., depending on location), "b" for highest outside temperature for which system remains in use in mild weather (usually 60° or 65° F.)

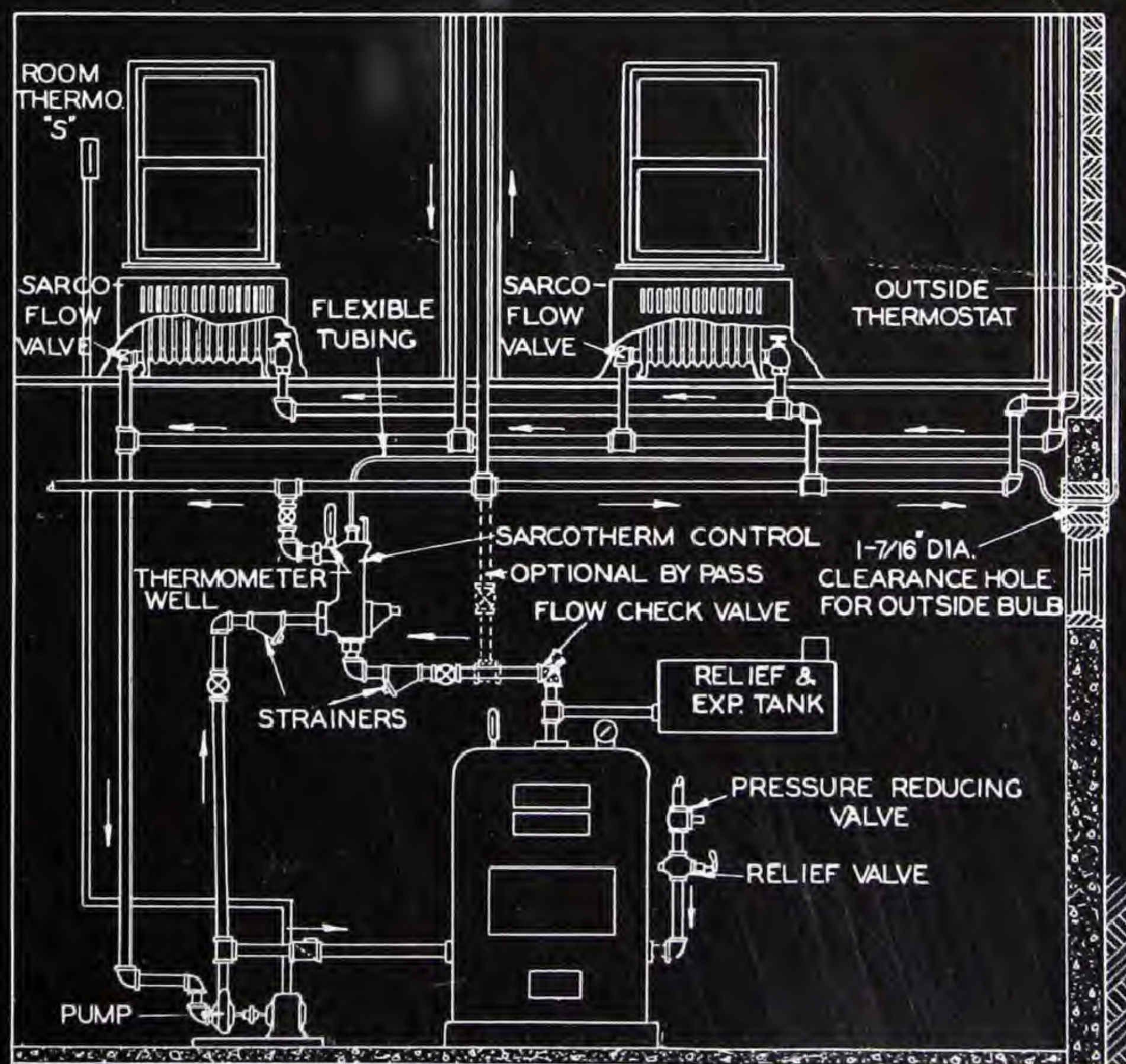


Fig. 3. Typical installation of Sarcotherm system, Type ST



### Compensating Room Control

HEAT loss from buildings is subject to variables, not all of which can be controlled in accordance with fluctuations of outside temperature alone. Exposure, wind velocity and direction, as well as the insulating properties of the building walls, all exert their influence. Because there is a certain lag between changes in atmospheric conditions and the temperature in the rooms, control by outside temperature alone may at times result in rooms becoming too warm. When desired, an automatic check can be provided to guard against such overheating.

On small systems, it may be considered satisfactory for this purpose temporarily to stop the circulating pump on the few occasions when this emergency will arise. This may be accomplished by an ordinary electric room thermostat (Sarco type LSU, Fig. 7) as shown in Fig. 3.

For larger installations and where the full benefits of continuous circulation should be maintained at all times, the Sarcotherm control can be provided with auxiliary room control, as illustrated in Figs. 4, 5 and 6.

This control is known as type STA and is similar to type ST except that the temperature sensitive system is equipped with an additional

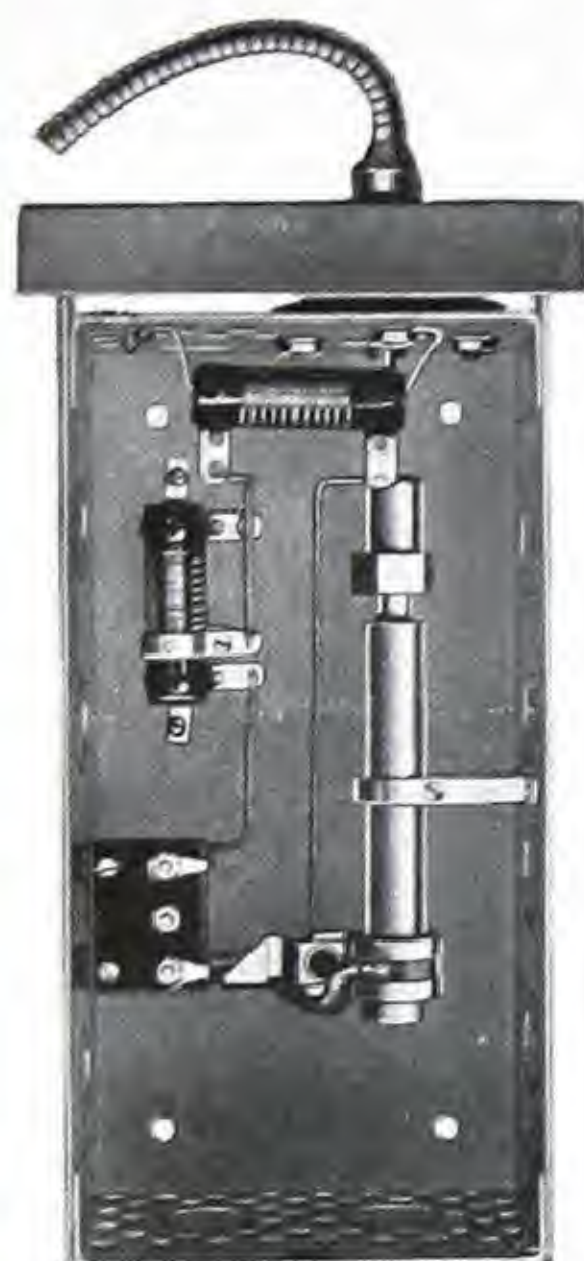


Fig. 4. Auxiliary bulb for type STA mounted in box with heater and resistances (lid raised).

bulb Q (Fig. 5). This bulb is fitted with a small electric heater Coil H, and a manually adjustable resistance R, mounted in a metal box for convenient attachment to a wall in the basement. (See also Fig. 4.)

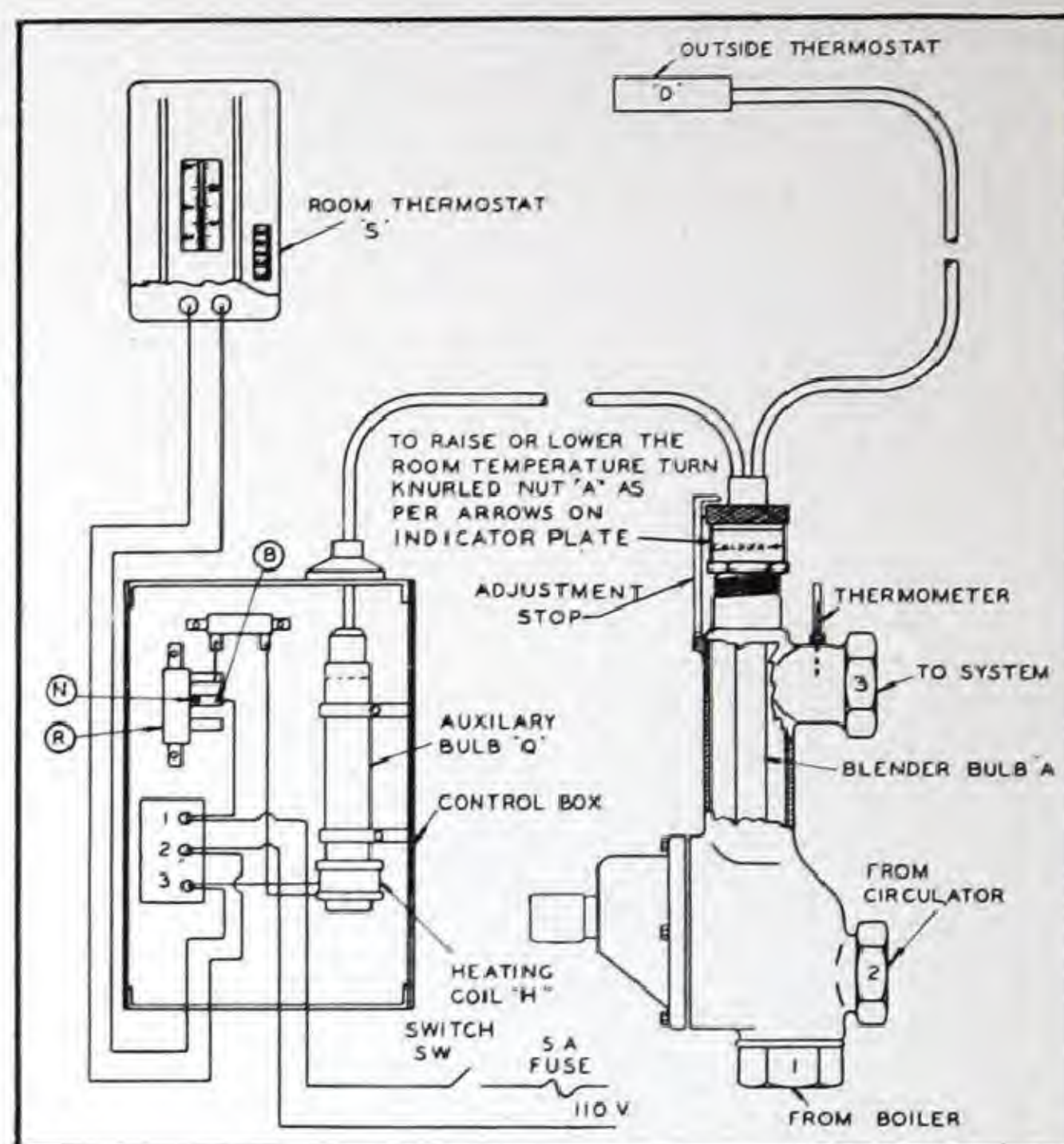


Fig. 5. Wiring diagram for type STA.

A Sarco room thermostat S (type LSU, Fig. 7) is placed in a key room, from which it is desired to check overheating of the system. The thermostat is wired to terminals 1, 2, 3 in the box. It has a normally open switch which acts to close the circuit to the heater H when the desired room temperature is reached. Heat thus applied to



Fig. 7. Sarco Room Thermostat, Type LSU.

bulb Q will cause extra expansion of oil in the thermostatic system, which results in the valve S (Fig. 1) closing entirely the hot water inlet port, and recirculating all of the water pumped

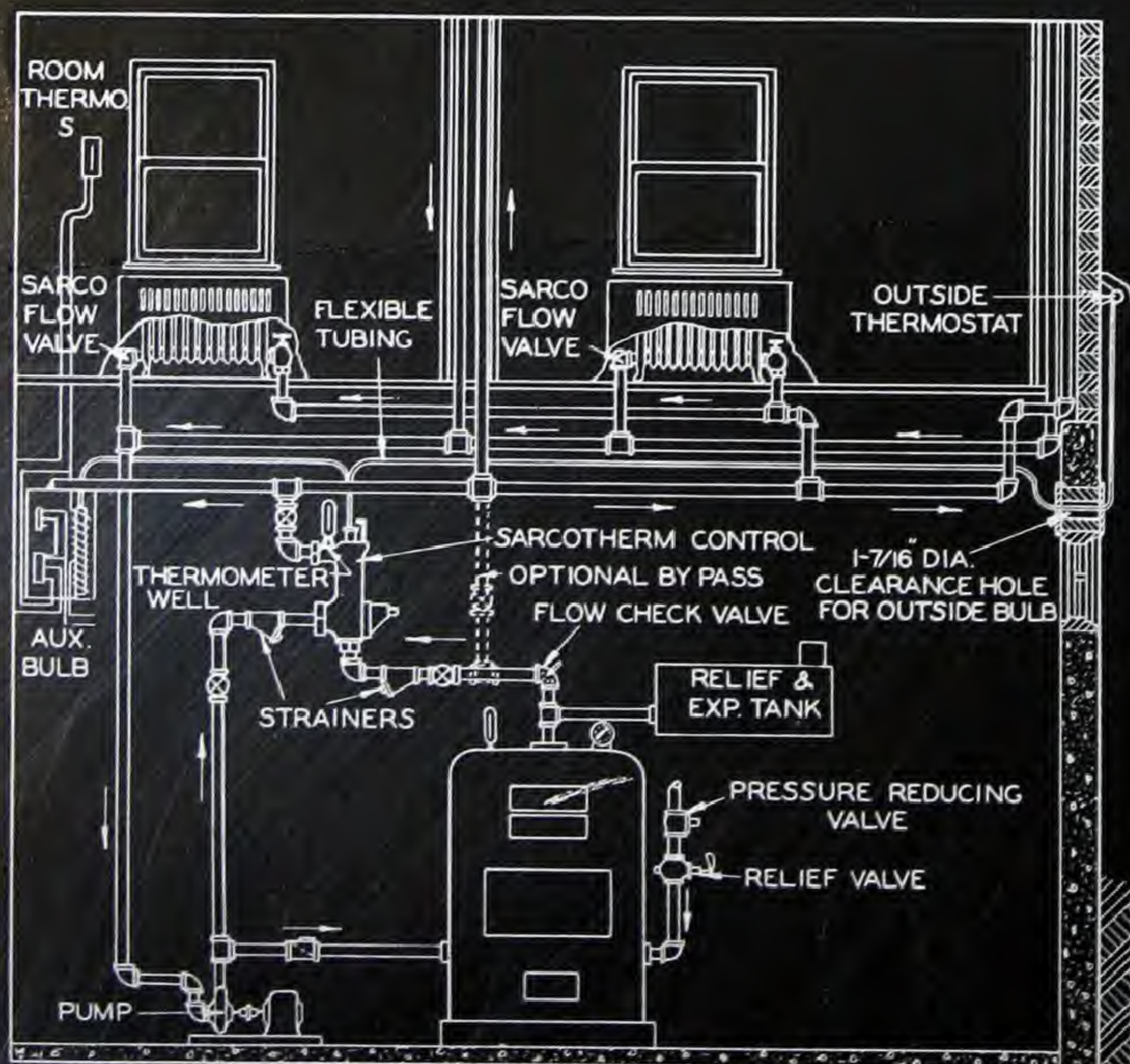


Fig. 6. Typical installation of Sarcotherm system, Type STA.



back thru the system. This effectively checks overheating while at the same time preserving the responsiveness of the system to outside temperature changes, because circulation is not interrupted.

Where automatic change of thermostat setting is desired for day and night operation at different temperatures, a dual, clock type thermostat can be substituted. We can also furnish an adjustable rheostat and time switch to change the effect of heater H for a lower room temperature at night. Details on application.

### Automatic Pump Stop

Where it is desired automatically to stop the circulating pump at times when no heat is needed in the building over long periods of mild weather, a double-switch Sarco room thermostat, type L2SU, can be substituted. The second switch would be normally closed and set to stop the pump motor a degree or two above the setting of the auxiliary check described above.

### List Prices and Shipping Weights, Sarcotherm, Type STA

Size	Construction	Connections	List Price	Shipping Wt. Lbs.
1 1/4"	Brass	Screwed	\$150.00	75
1 1/2"	Brass	Screwed	153.00	75
2"	Iron	Screwed	165.00	95
2 1/2"	Iron	Screwed	190.00	130
3"	Iron	Screwed	210.00	130
4"	Iron	Flanged	263.00	195

Above prices include 20 ft. of flexible connecting tubing between outside thermostat and valve, and 6 ft. between valve and auxiliary inside bulb. For longer connecting tubing up to a maximum of 100 ft., add 50c list per foot.

When ordering, specify, in addition to items 1-3 for type ST (see page 177) 4, Length of connecting tubing for auxiliary bulb (6 ft. is standard and included in price); 5, control by simple thermostat or by day and night clock; 6, electric current characteristics.

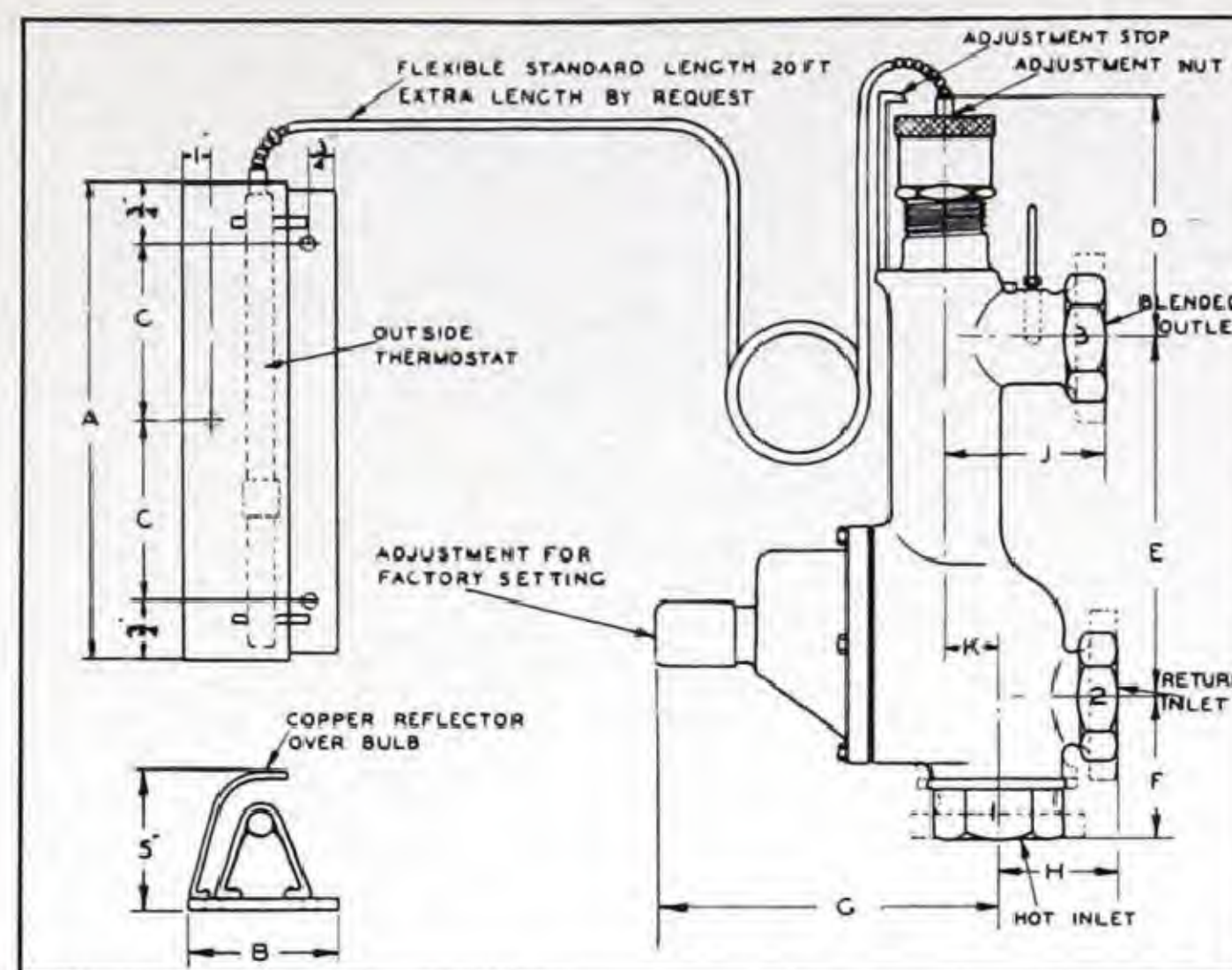


Fig. 8. Roughing-in dimensions of Sarcotherms.

Size	A	B	C	D	E	F	G	H	J	K	L*
1 1/4"	12 7/8"	3 1/2"	5 11/16"	5"	7 9/16"	3 5/8"	6 9/16"	2 5/8"	4"	1"	14 1/2"
1 1/2"	12 7/8"	3 1/2"	5 11/16"	5"	7 9/16"	3 5/8"	6 9/16"	2 5/8"	4"	1"	14 1/2"
2"	16"	3 1/2"	7 1/4"	5"	11 3/4"	4 5/8"	8 9/16"	3 1/4"	4 1/8"	1 1/4"	18"
2 1/2"	16"	3 1/2"	7 1/4"	5 11/16"	13 9/16"	6 3/4"	9 9/16"	4 1/2"	4 1/2"	1 7/16"	20"
3"	16"	3 1/2"	7 1/4"	5 11/16"	13 9/16"	6 3/4"	9 9/16"	4 1/2"	4 1/2"	1 7/16"	20"
4"	16"	3 1/2"	7 1/4"	6 1/16"	18 5/16"	8 1/2"	11 7/16"	5 1/16"	4 3/4"	2"	25"

\*L = Clearance required above valve to remove thermostat.

### Installation

In installing the outside thermostat on exterior wall of building, be sure to leave the opening in the wall for the connecting tubing large enough to permit of subsequent withdrawal of the bulb, if necessary. This bulb cannot be detached from the tubing. Split plates with small holes can be placed over the opening to make a neat appearance. In installing the Sarcotherm valve, arrange for sufficient clearance above it, so that thermostatic unit can be withdrawn for inspection and cleaning of valve. (See dimension L above.)



Fig. 9. Capacities of Sarcotherms.

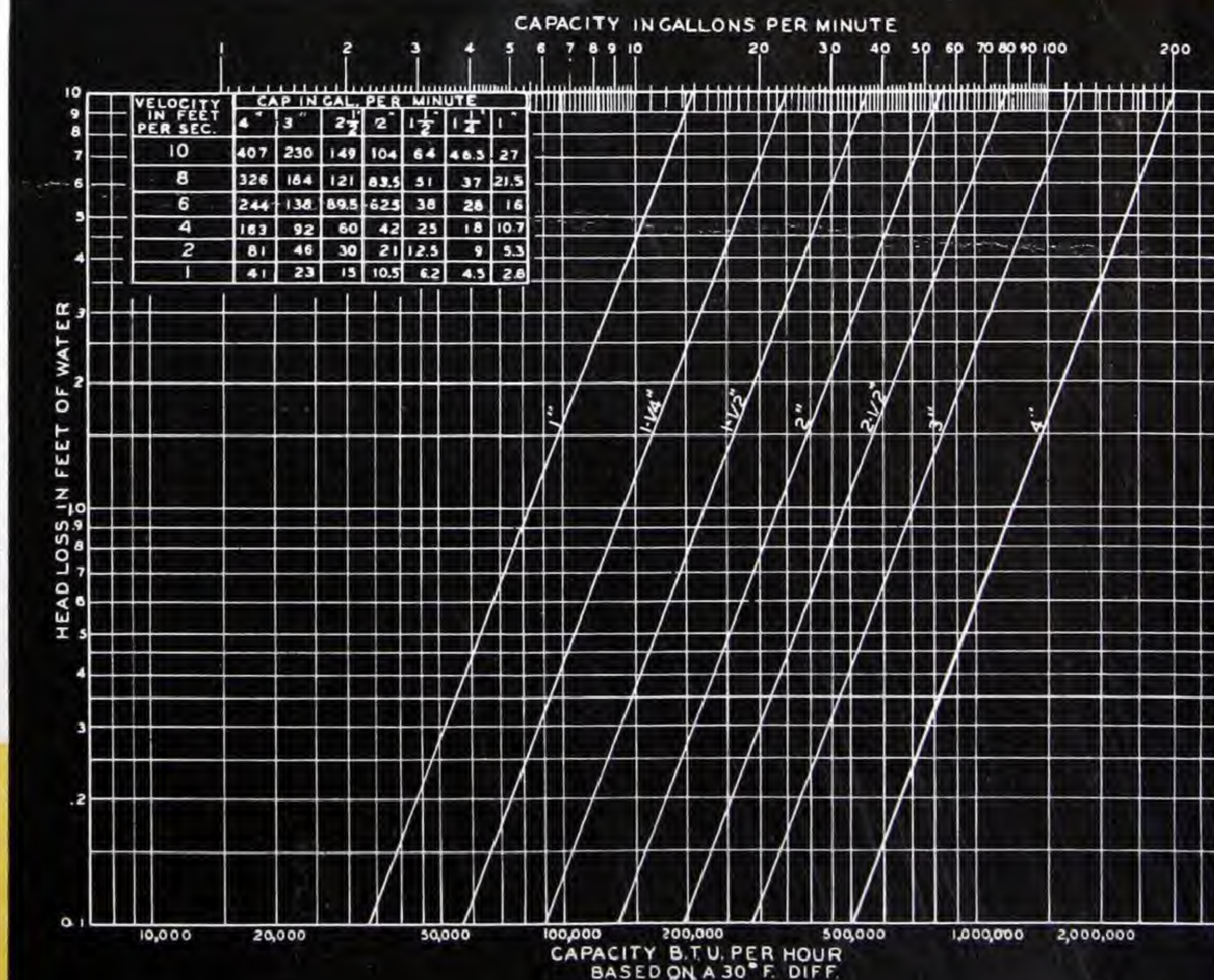






Fig. 10. Angle Union Pattern, Thread Type 10



Fig. 11. Angle Union Pattern, Sweat Type 20



Fig. 12. Straightway Union Pattern, Thread Type 30



Fig. 13. Straightway Union Pattern, Sweat Type 40



Fig. 14. Straightway Screwed Pattern, Thread Type 50



Fig. 15. Straightway Soldered Pattern, Sweat Type 60

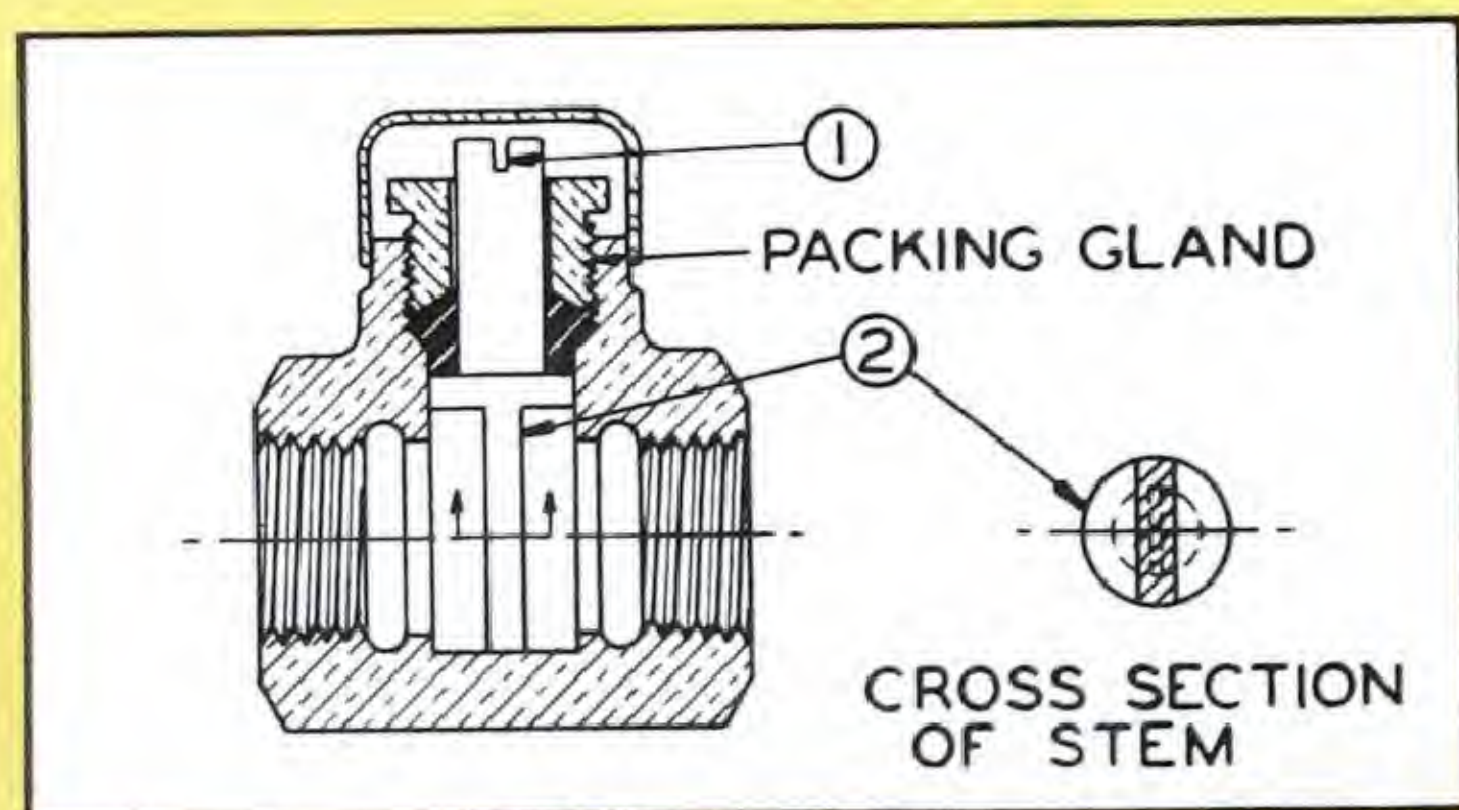


Fig. 16. Construction of Sarcoflows.

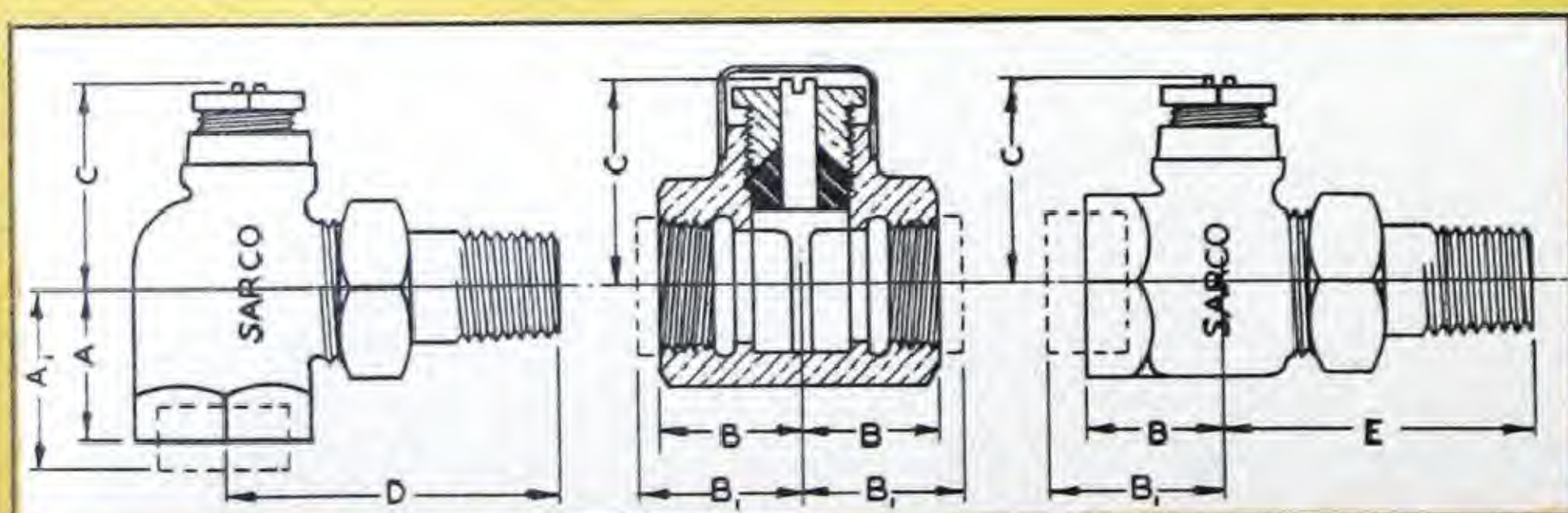


Fig. 17. Dimensions of Sarcoflows.

## SARCOFLOW Balancing Valves

TEMPERATURE control direct by the weather presupposes a well balanced heating system. To secure uniform room temperatures, each radiator requires water at a definite temperature.

Assuming constant water temperature at the boiler, the actual temperature in any given radiator will depend upon its distance from the boiler, because varying lengths of piping will affect both the heat loss from the pipes and the speed of circulation.

Varying of pipe sizes cannot fully compensate for these temperature losses, because available sizes are too limited.

Completely balanced systems result when a Sarcoflow balancing valve is installed in the outlet from each radiator in place of the ordinary union elbow.

Sarcoflows serve to restrict the flow of water to near-by radiators. Adjustment is made by inserting a screwdriver at 1 (Fig. 16) and turning the valve plug 2 until the desired room temperatures are secured.

Sarcoflow balancing valves are available in two styles—for threaded pipe and sweat type for copper pipe, and in three patterns, angle union inlet, straightway union inlet and straightway screwed (see illustrations) in sizes  $\frac{1}{2}$ " to 1" inclusive.

### List Prices

Thread Type				Sweat Type			
Angle Union Pattern				Angle Union Pattern			
Type No.	Union Inlet	Screwed Outlet	List Price	Type No.	Union Inlet	Outlet	List Price
V-10	$\frac{1}{2}$ "	$\frac{3}{8}$ "	\$1.40	V-20	$\frac{1}{2}$ "	$\frac{3}{8}$ "	\$1.40
V-11	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1.40	V-21	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1.40
V-12	$\frac{3}{4}$ "	$\frac{3}{4}$ "	1.75	V-22	$\frac{3}{4}$ "	$\frac{3}{4}$ "	1.75
V-13	1"	1"	2.50	V-23	1"	1"	2.50
Straightway Union Pattern				Straightway Union Pattern			
V-30	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1.40	V-40	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1.40
V-31	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1.40	V-41	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1.40
V-32	$\frac{3}{4}$ "	$\frac{3}{4}$ "	1.75	V-42	$\frac{3}{4}$ "	$\frac{3}{4}$ "	1.75
V-33	1"	1"	2.50	V-43	1"	1"	2.50
Straightway Screwed Pattern				Straightway Soldered Pattern			
	Inlet	Outlet			Inlet	Outlet	
V-50	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1.20	V-60	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1.20
V-51	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1.20	V-61	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1.20
V-52	$\frac{3}{4}$ "	$\frac{3}{4}$ "	1.50	V-62	$\frac{3}{4}$ "	$\frac{3}{4}$ "	1.50
V-53	1"	1"	2.10	V-63	1"	1"	2.10

These prices are exclusive of Caps. Caps are furnished only when ordered and are charged 10c list extra. For roughing-in dimensions, see below.

### Dimensions

Size	A	A1	B	B1	C	D	E
$\frac{1}{2}$ x $\frac{3}{8}$ "	$1\frac{7}{16}$ "	$1\frac{1}{16}$ "	$\frac{7}{8}$ "	1"	$1\frac{1}{2}$ "	$2\frac{3}{16}$ "	$2\frac{3}{8}$ "
$\frac{1}{2}$ x $\frac{1}{2}$ "	$1\frac{7}{16}$ "	$1\frac{1}{16}$ "	$\frac{7}{8}$ "	1"	$1\frac{1}{2}$ "	$2\frac{3}{16}$ "	$2\frac{3}{8}$ "
$\frac{3}{4}$ x $\frac{3}{4}$ "	$1\frac{1}{2}$ "	$1\frac{5}{8}$ "	1"	$1\frac{1}{8}$ "	$1\frac{1}{2}$ "	$2\frac{13}{16}$ "	$2\frac{1}{2}$ "
1 x 1"	$1\frac{5}{8}$ "	$1\frac{11}{16}$ "	$1\frac{1}{4}$ "	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	$3\frac{1}{4}$ "	3"

Approximate shipping weights, all types,  $\frac{1}{2}$ ", 1 lb.;  $\frac{3}{4}$ ",  $1\frac{1}{2}$  lbs.; 1", 2 lbs.



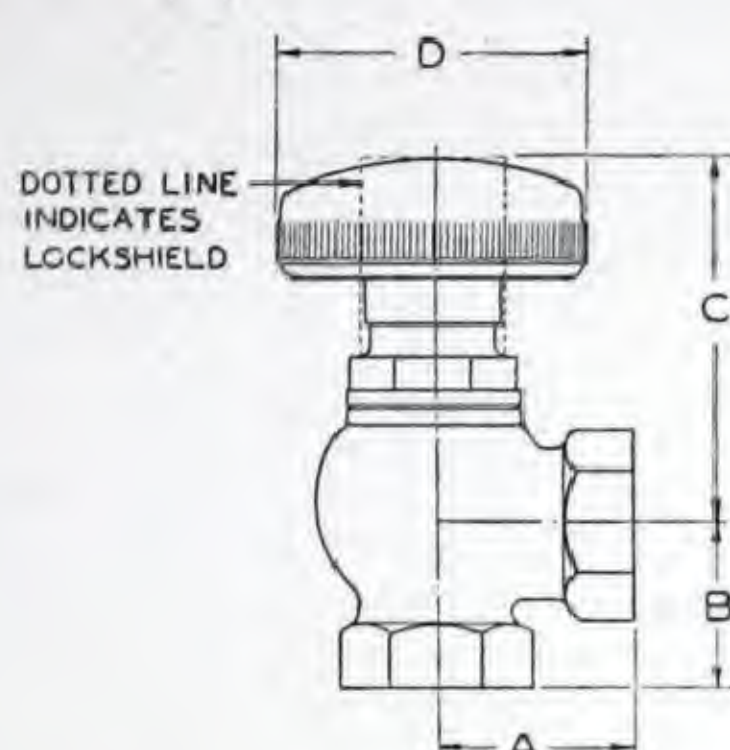
## Radiator Valves

The use of Sarcoflow balancing fittings on the radiator outlets makes unnecessary any special or complicated valve on the inlet. We recommend the simple, sturdy and attractive valve illustrated.

Sarco type V radiator valves are designed to meet the requirements of the War Production Board. The body is of iron with right and left screwed connections. It is made in angle pattern only, as shown in Fig. 18. Type V is a quick-opening valve of the non-rising stem type. Renewable Jenkins disc is provided. It can be furnished with vent hole thru disc if so ordered.

Molded packing, compressed by a spring, seals the stem. Re-packing never is necessary.

Maximum water pressure is 60 lbs. per sq. in.



List Prices and Dimensions

Size	List Price	Shipping Weight	DIMENSIONS			
			A	B	C	D
$\frac{3}{4}$ "	\$3.75	2 lbs.	$1\frac{5}{8}$ "	$1\frac{1}{4}$ "	$2\frac{13}{16}$ "	$2\frac{9}{32}$ "
1"	4.50	$2\frac{1}{4}$ lbs.	$1\frac{7}{8}$ "	$1\frac{1}{2}$ "	$2\frac{7}{8}$ "	$2\frac{9}{32}$ "

## Air Eliminators

In the design of all hot water systems, it is of utmost importance to prevent dips or sags in the piping to avoid the formation of air pockets, which greatly retard circulation.

At any point where a pocket could form, an air vent or eliminator should be provided. Two types of air eliminators are available, as shown in Figs. 19 and 20.

**Type 6W** has  $\frac{3}{4}$ " inlet connection and is suitable for water pressures up to 65 lbs. The outlet has  $\frac{3}{8}$ " pipe thread so that it can be piped to a point where spilling water will do no damage. List Price \$12.50 Shipping Weight, 4 lbs.

On special order can be furnished with perforated cap over outlet as shown in right hand view, at 75c list extra.

**Type 12W.** A larger unit, with 1" IPS inlet and  $\frac{1}{2}$ " tapped outlet. Suitable for pressures up to 125 lbs.

List Price \$25.00 Shipping Weight, 8 lbs.

On special order can be furnished with perforated cap over outlet as shown in left hand view at \$1.60 list extra.

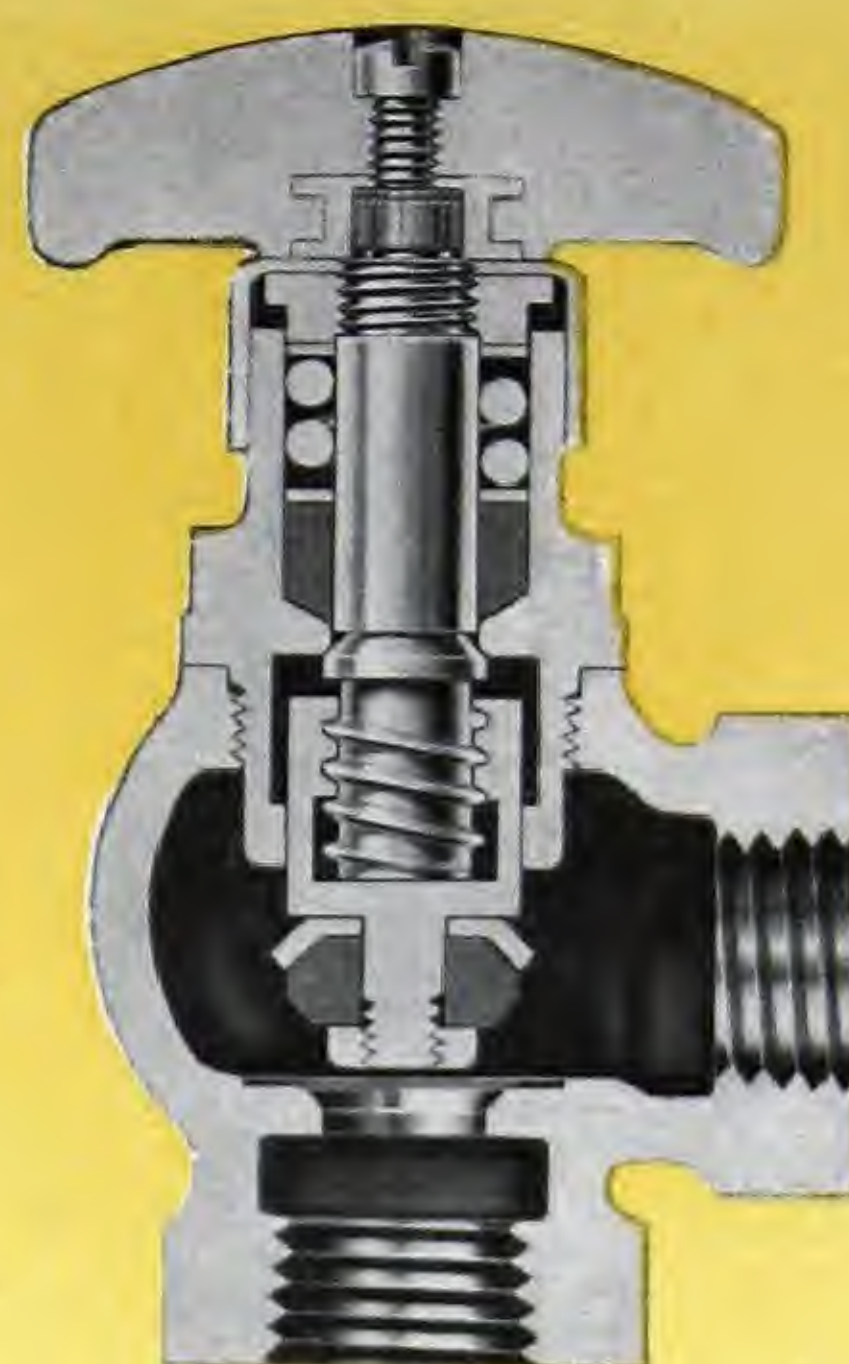


Fig. 18. Sarco type V Radiator Inlet Valve. Non-rising stem, quick-opening.

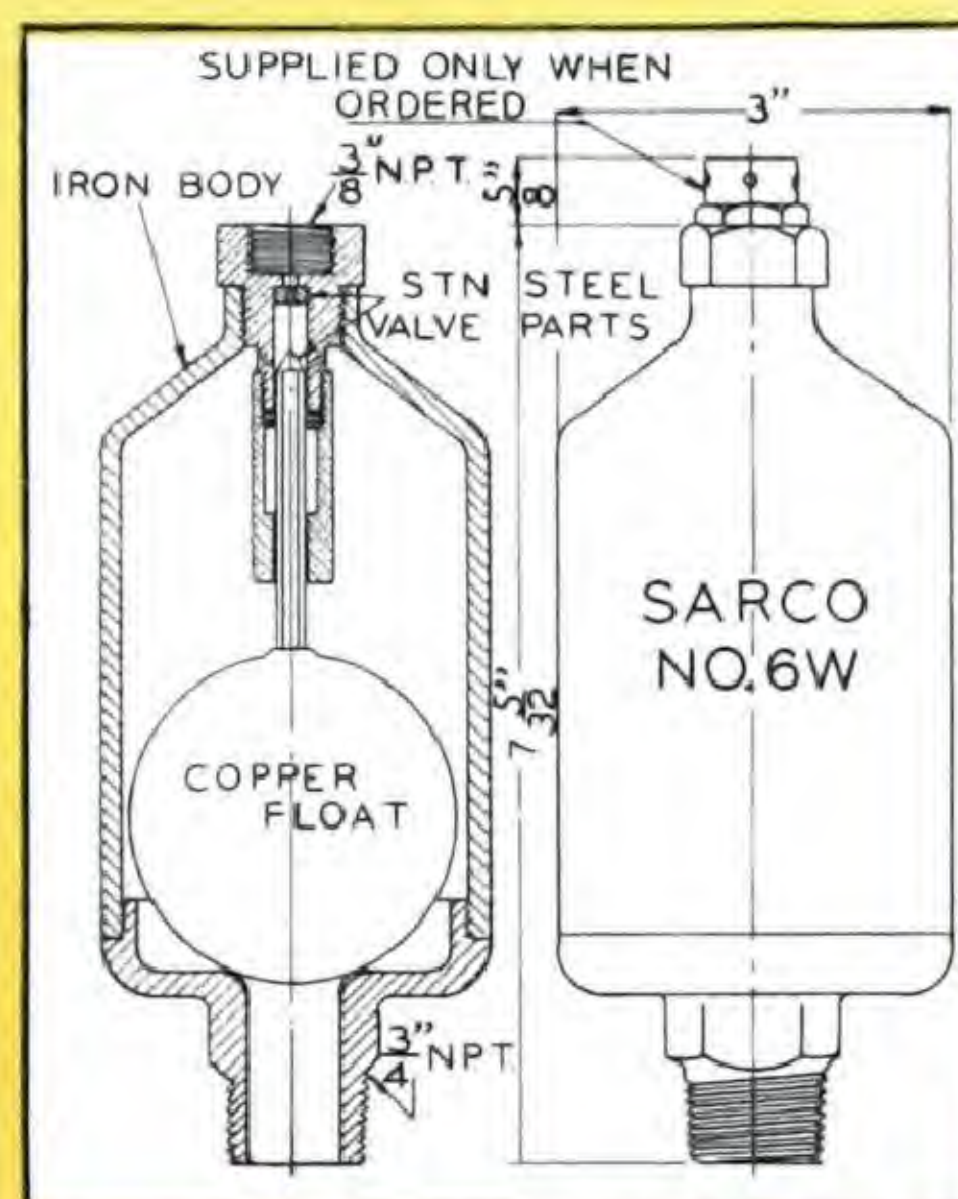


Fig. 19. Sarco Air Eliminator, Type 6W.

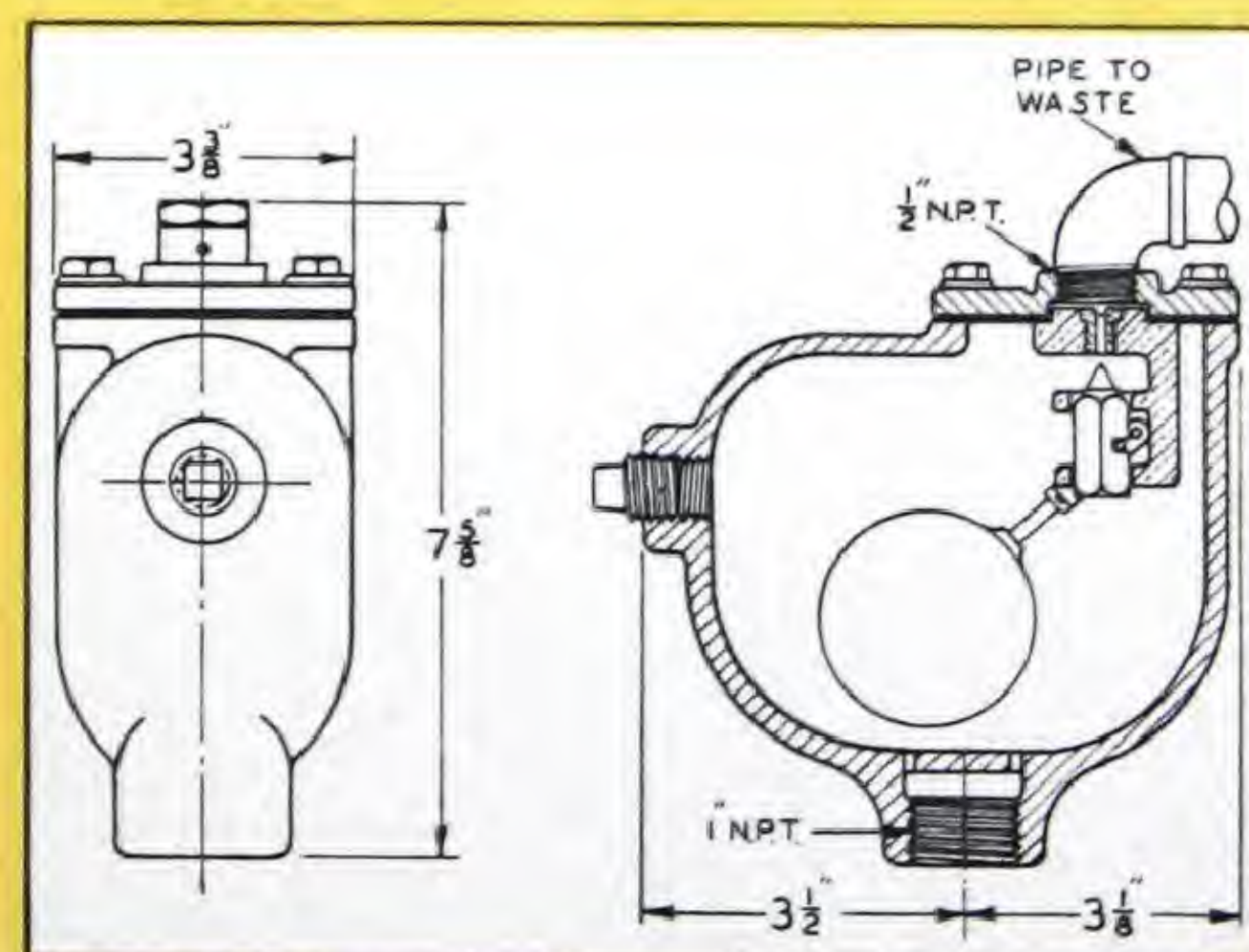
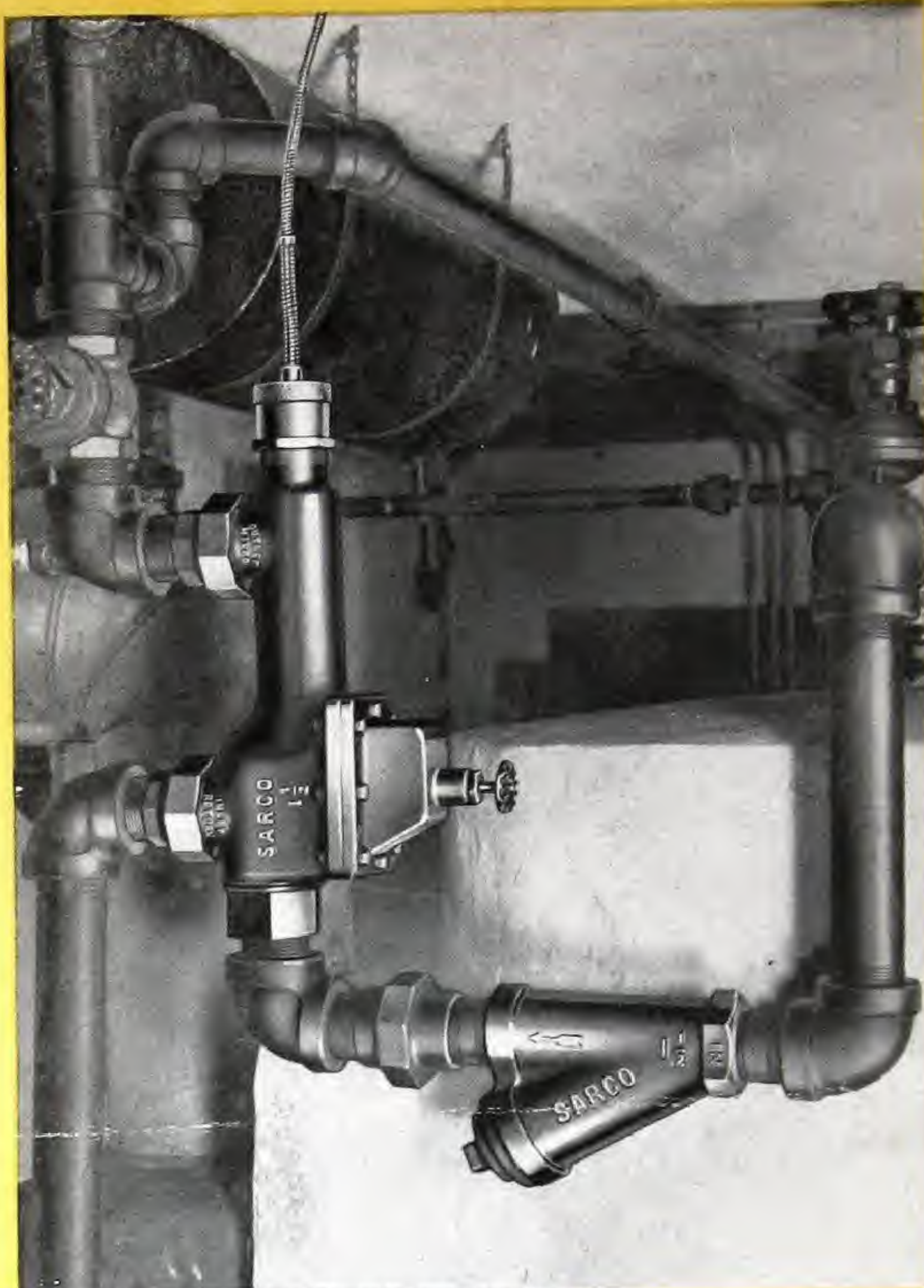


Fig. 20. Sarco Air Eliminator, Type 12W.



Installation of Sarcotherm at Residence of Dr. and Mrs. McIntosh, Lake Forest, Ill. (See front cover.)  
Note the compact installation requiring little extra room.



Sarcotherm Equipped—L. D. Milligan Residence, Lake Forest, Ill. Anderson & Ticknor, Lake Forest, Ill., Architects.



Sarcotherm Equipped—New plant of Harpe Wyman Mfg. Co., Chicago, Ill. S. R. Lewis, Chicago, Consulting Engineer.



Sarcotherm Equipped—"Hanover Acres," Federal Housing Project, Allentown, Pa. Geo. Yundt, Allentown, Pa., Architect. 33-2 1/2" and 2-3" type ST are installed here.

